

CALIFORNIA ACADEMY OF SCIENCES

ANNUAL REPORT

1987-1988



CALIFORNIA ACADEMY OF SCIENCES

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MESSAGE FROM THE CHAIRMAN

THERE IS MUCH ACTIVITY at the Academy as the staff prepares for the opening of "Wild California" early in the new fiscal year. Seventy-year-old North American Hall is being completely renovated to reflect current scientific information, and state-of-the-art display techniques and electronics are used to convey the beauty of nature and the message of science. Another great hall, well under way, is "Life Through Time," which will open in early 1990. This new project will display fossil history—the evolution of life on Earth. Evolution has been sadly missing from our children's textbooks, or has been watered down to the point of being meaningless and confusing! In "Life Through Time" the Academy will display the overwhelming evidence for evolution and unfold its fascinating story.

The excitement in the Academy these days is largely due to the leadership of Executive Director Frank Talbot over the past seven years. The Trustees charged Frank with the task of setting the Academy on a new course, and with the work of the exceptional Academy staff and many, many volunteers, this has been well done. A bold Academy Master Plan has been developed and the first phase is under way.

The Academy is today a very lively place. The display halls have been improved, with both new exhibits like Hohfeld Earth and Space Hall (with the "Safequake," a feet-on experience), and elegantly upgraded ones like the wonderful "walk in" African Waterhole, where one can now listen to the thrilling sounds of day and night in the African veld.

Membership has nearly doubled in the past seven years, and our flagship magazine, *Pacific Discovery*, is now in full color and a joy to receive.

The scientific mission of the Academy continues to take top priority. There is a newly funded curatorial chair in diatoms. The Academy has one of the world's largest collections of these microscopic single-celled algae with silica skeletons, which form the basis of many marine and freshwater food chains. Diatoms are useful to us in many diverse ways, from helping to assess historical salinity and temperature changes in estuaries like San Francisco Bay to enhancing the cleaning power of abrasive cleansers and tooth powder. There is also a new laboratory of molecular systematics, where our researchers puzzle out the relationships of animals and plants through genetic "fingerprinting." The Christensen Research Institute has provided funds to send twenty-five scientists to our Pacific Rim neighbor, Papua New Guinea, over a five-year period. Our researchers will study fauna and flora in the rainforests, rivers, and coral reefs of one of the richest areas of the Pacific. Some staff members are writing handbooks on their specialties for the use of the people of New Guinea and for tropical scientists around the world.

The distinguished scientific Fellows of the Academy are playing a much more active role in Academy affairs. They are contributing to a major Education Department program that puts northern California teachers in touch with researchers working on the frontiers of science. To date, over 450 teachers have attended these Biology Forums.

The Academy has initiated a series of biennial scientific symposia on topics of importance. The proceedings of the second and third of these have just been published as CAS Memoirs: *Tropical Rainforests: Diversity and Conservation*, and *Biomedical Importance of Marine Organisms*.

We are now considered to be a leader among natural history museums worldwide, but there is still much to be done. The Trustees are actively searching for a new director to keep us ahead of the field. This is important to all of us involved in the Academy, certainly to our staff and volunteers but particularly to our members and our visitors, 1.5 million strong. They deserve the best science information in our displays and the most exciting education programs we can provide.

Sadly for us, Frank Talbot leaves the Academy in January 1989 to become Director of the National Museum of Natural History/National Museum of Man at the Smithsonian Institution, on the Mall in Washington, D.C. We thank Frank and his wife Sue (also a scientist, and a keen Academy docent) for their enthusiasm and energy, and for setting the tone and leading the Academy for the past seven years, and wish them well in their new endeavors.

Jeffery W. Meyer
Chairman, Board of Trustees

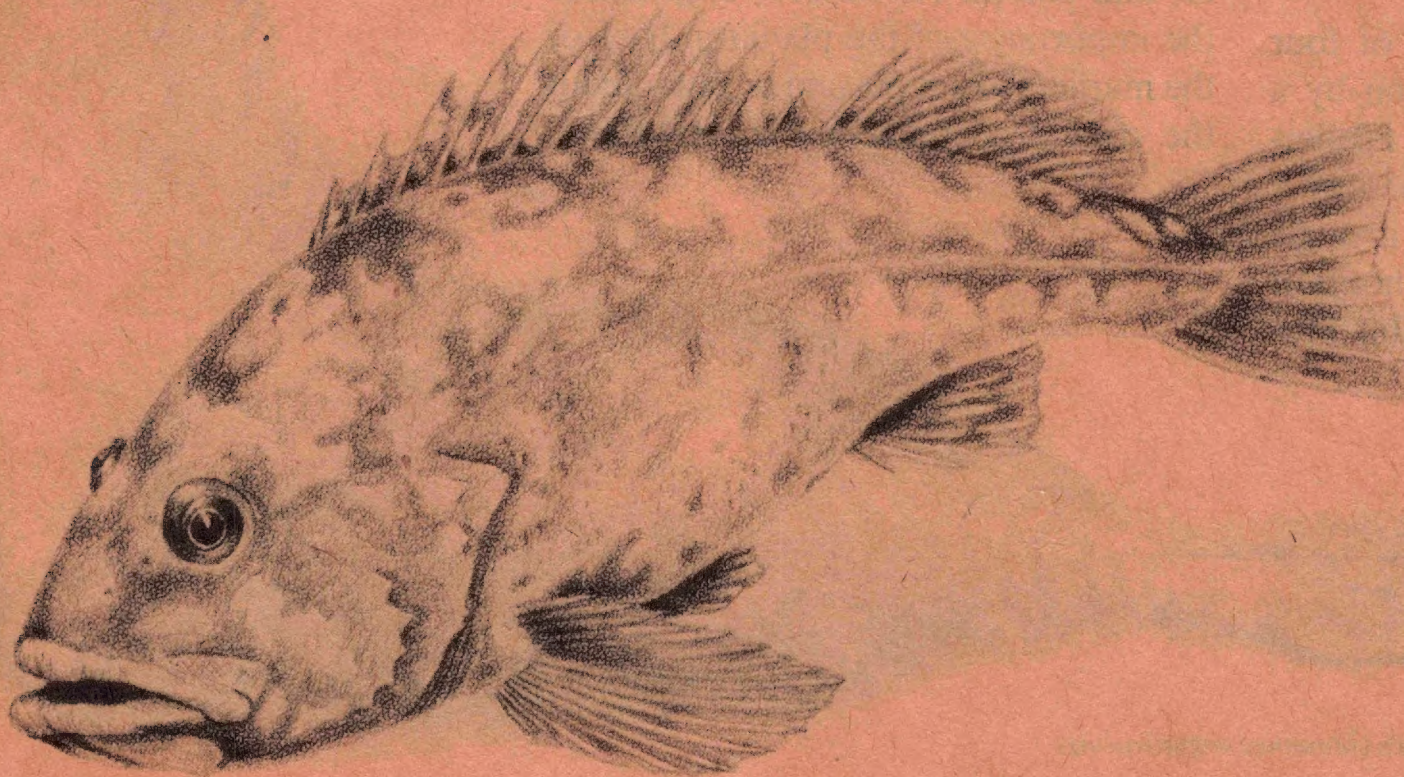
DIRECTOR'S STATEMENT

THE YEAR HAS BEEN A very successful one for the Academy. Most importantly, the approvals for the Academy Master Plan and its Environmental Impact Report have passed with unanimous support through the San Francisco Planning Commission, the Arts Commission, the Recreation and Parks Commission, the Board of Supervisors, and the Mayor. The plans are moderate, and do not increase the footprint in Golden Gate Park, but I believe the strong support we have received is due to a good and long-standing relationship between the Academy and the people who use it. The staff and volunteers of the Academy love the interaction with our visitors, members, and those who take our courses. In my own involvement with museums on four continents, I know of no single institution with such excellent public/staff accord as the Academy.

During the year the Academy reached its funding goal for the first phase of the Master Plan, which we have called "The Academy for the '90s." Phase One is now going well, with construction of the new Jewett Hall out to bid, "Wild California" in Meyer Hall nearly ready for opening, and the big evolution exhibit "Life Through Time" (the first permanent exhibit in the Peterson/McBean Hall) under way and planned for opening in early 1990.

With all this activity and anticipation it is difficult for me to realize that this, my seventh Annual Report, is also my last. In January, my wife Sue and I will be moving to the Smithsonian Institution. The many changes in the Academy that have occurred in the past seven years are due to an imaginative, talented, and hard-driving staff who just needed encouragement (and some funds!) to make a great museum better, and to Trustees and Fellows who have always provided enthusiastic support and good judgment. The Academy and its many supporters are a most important part of our lives, and will ever remain so. We thank you all for a rich seven years.

Frank H. Talbot
Executive Director



Copper rockfish (*Sebastes caurinus*)

WILD CALIFORNIA

THE BULKY SHAPES of two fighting bull elephant seals are close enough for a visitor to touch, the scars from previous battles visible on the animals' huge necks. The bulls eye each other warily as they prepare to collide again. Their battle cries resound above the pounding ocean waves and the calls of seagulls overhead.

A few steps away from the roaring bulls, one is drawn into a silent world of translucent blue-green water. An almost-transparent krill swims at arm's length. Suspended in mid-water, one tentacle of a 25-foot-long feather duster worm scoops up all diatoms within reach. In the fading light, seldom-seen, otherworldly creatures shimmer in this tablespoon of seawater enlarged 200 times.

Safe and dry, visitors can explore the rugged Farallon Islands, a Sierran winter landscape, and the California desert, re-assembled here at the Academy. Welcome to a new and unique exhibit: "Wild California: A State of Diversity," which is close to completion.

Located in Meyer Hall, formerly known as North American Hall (1916), "Wild California" will be more than a collection of dioramas. An ambitious and innovative series of exhibits, "Wild California" provides a comprehensive view of the state's natural history, geology, and wildlife.

The dioramas are the result of four years of planning and production by a diverse team of scientists, artists, taxidermists, muralists, photographers, and a host of volunteers. "Producing a single full tree represents thousands of hours of volunteer work," declares Exhibit Production Manager Dean Weldon.

Six of the thirteen dioramas which will be seen in the new Meyer Hall are updated versions of North American Hall displays. The historic murals and prepared specimens and plants are being cleaned and refurbished for use in "Wild California." The new dioramas "Oceanic Spring Aquarium," "Sea Meadow," and "Pacific Beach Wrack" take exhibit design a step beyond the classic displays. As Exhibits Chairman Robert Kosturak says, "They bring you into a world that you can never enter by yourself."

At the entrance to Meyer Hall, an introductory exhibit on the history and symbolism of California's statehood will surround "Monarch," the grizzly bear that served as a model for the state's flag. At the far end of the hall, the largest diorama, "Oceanic Spring Aquarium," dominates with a split-level view of marine wildlife. Fish will swim in a 14,000-gallon aquarium behind a six-inch-thick acrylic window. Above, birds will nest in the fiber-reinforced plaster and styrofoam cliff. The display was funded by the James Irvine Foundation.

Only a few steps separate the rookery from "Farallon Winter," funded by Mr. and Mrs. Alfred S. Wilsey, where visitors experience the battle of the elephant seals.

The "Sea Meadow," funded by Gladys G. and Joseph A. Moore, emphasizes the importance of the plankton base of the marine food chain and teaches about the coastal phenomenon of upwelling.

"Designing the 'Sea Meadow' was a problem," says Weldon. "Since everything is the size of a head of a pin, or smaller, we spent lots of time with the scanning electron microscope observing minute details of live creatures." Artist Gloria Nusse and biologist Sue Talbot, a specialist in euphausiid shrimp, dissected the tiny organisms to learn about their anatomy.

"Pacific Beach Wrack" enlarges by a factor of fifty a handful of seaweed tossed on the beach during high tide. "You pick up a piece of kelp on the beach, and it just swarms with life," says Research Director David Kavanaugh. "'Beach Wrack' emphasizes the conflict between



Two northern elephant seals (*Mirounga angustirostris*)

sea-oriented crustaceans and land-oriented insects competing for a limited resource as the kelp decomposes on the beach." A giant rove beetle crawls beneath a kelp blade suspended in the air. A kelp fly turns its multifaceted eye toward the visitors. When the diorama is complete, seven people will have spent six months building the "Beach Wrack"—down to hand molding every hair on the insects. The diorama is funded by Mrs. Jane B. Dunaway.

Still strolling along the ocean beach, the visitor will walk "Between the Tides." Four life zones are exposed on a rocky cliff near Montara at low and high tide. The myriad creatures, both sculpted and preserved, will be displayed here thanks to Mr. and Mrs. Paul L. Davies, Jr., Mr. and Mrs. Segundo Mateo, and Mr. and Mrs. Paul L. Davies III.

Turning inland, one will encounter a "Salt Marsh Nursery." Saltwater and freshwater mix in this special environment. The birds include avocets, curlews, kingfishers, and great blue herons. The "Salt Marsh" is funded by E. Morris Cox.

A riparian habitat in the Central Valley is represented by the "Tule Marsh," funded with the support of Academy members. The five tule elk were part of the original 1916 display.

Probing further inland, the visitor crosses an "Oak Woodland" in Mendocino County. Small mammals, with a skunk family in the foreground, will scurry across the forest floor while an acorn woodpecker perches overhead. "The madrone tree trunks are real," says Weldon, "but the branches will be wired up for support." The "Woodland" is funded by Joan and Peter Avenali.

Representing arid California are the "Great Basin Desert," funded by Mr. and Mrs. Paul M. Wythes, and the "Desert Floor," funded by James Q. and Claire Hudson Brett. "You want that? Take all you need, the cattlemen will love you," was the locals' reaction when Academy scientists went to collect rabbitbush and sagebrush near Cedarville in the Great Basin east of the Sierras.

The "Early Sierra Winter" creeps in after the first November snowfall. A group of mule deer migrates to lower wintering grounds, stepping on autumn

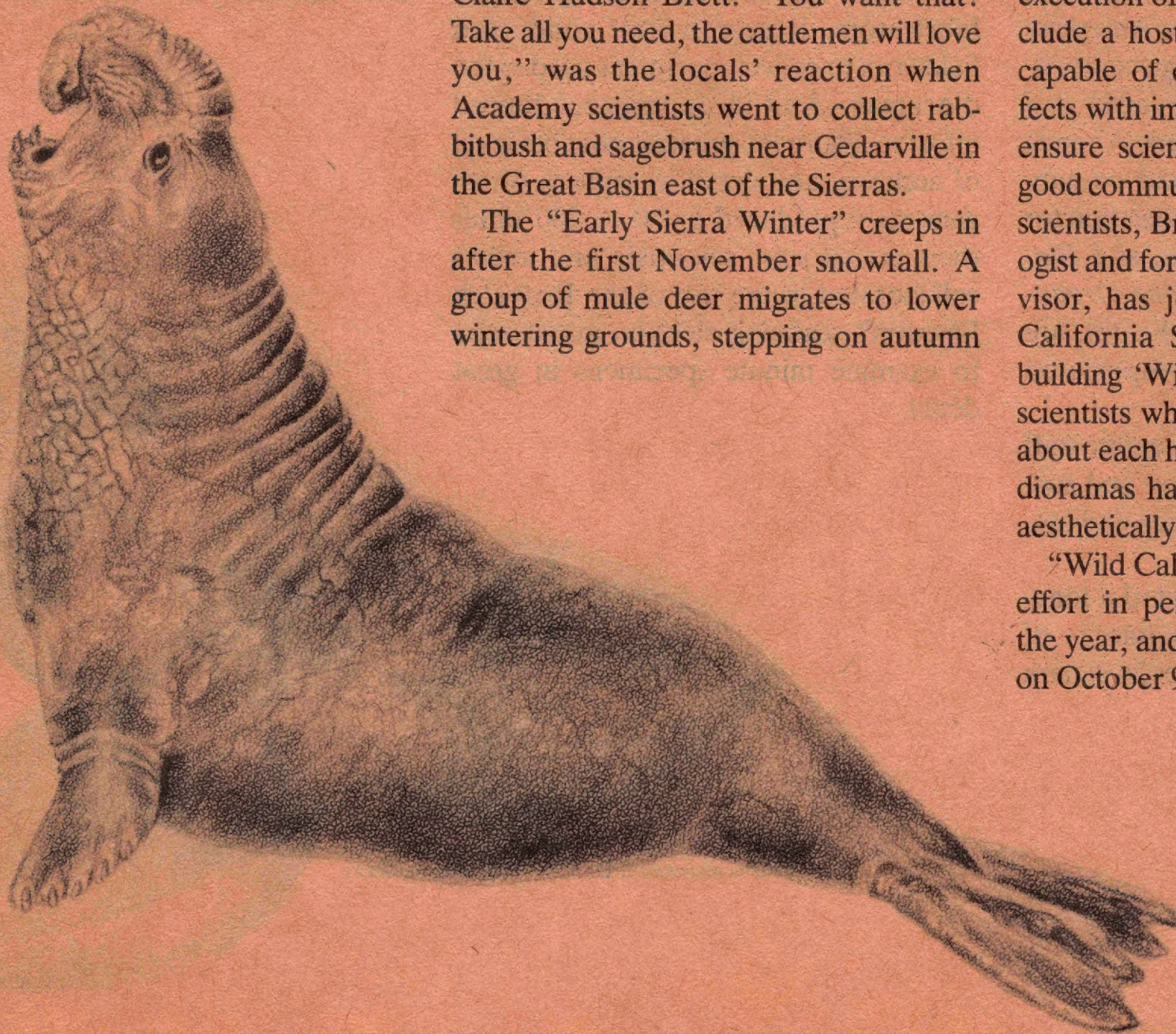
leaves and polystyrene snow. Since sunlight bathed the original exhibits, the seventy-year old animals' fur was bleached by the ultraviolet rays. This year, artists are repainting each deer's white-tipped winter fur. Diorama lighting now excludes most of the ultraviolet spectrum. The "Sierra Winter" is funded by Sara and William R. Kimball.

The "Montane Slope" is also one of the original 1916 dioramas brought up to date, thanks to the generosity of Betty and Gene Shurtleff. But because no more grizzlies live in California, this mother and cub inhabit a Wyoming slope.

Each of the dioramas will be accompanied by a three-minute video (produced by Sea Studios) explaining its scientific background, and a backlit panel, illustrated by Pedro Gonzales in the style of a naturalist's notebook. The video stations have been made possible by a gift from the William G. Irwin Charity Foundation.

Many people have collaborated in the execution of "Wild California." They include a host of researchers, and artists capable of creating precise, lifelike effects with imaginative new materials. To ensure scientific accuracy and enhance good communication between artists and scientists, Brian Gibeson, a marine biologist and former Junior Academy Supervisor, has joined the project as Wild California Science Advisor. "We are building 'Wild California' to satisfy the scientists who know the intimate details about each habitat," Gibeson says. "The dioramas have to be both accurate and aesthetically pleasing to be successful."

"Wild California" has been our major effort in permanent exhibitions during the year, and is due to open to the public on October 9, 1988.



RESEARCH

“S”CIENTIFIC RESEARCH comes to nothing until it is published,” declares Research Director David Kavanaugh, “and 1987–1988 has been an exceptional year for scientific publications at the Academy.” For the first time in the Academy’s 134-year publishing history, four book-length, monographic studies were published in the same year with two more volumes scheduled for release soon after the close of the fiscal year. Under the direction of Scientific Publications Editor Daphne G. Fautin, twelve new titles were issued in the Academy’s series of *Proceedings* and *Occasional Papers*, and a new catalogue was compiled.

New titles in the Academy’s *Memoir* (monograph) series include *Causes of Spatial and Temporal Patterns in Rocky Intertidal Communities of Central and Northern California* by Michael S. Foster, et al., and *Revision of North American Tachysphex Wasps Including Central American and Caribbean Species* by Wojciech J. Pulawski. The latter received an Award of Distinction in the Scientific Publications category in the American Association of Museums design competition. *Tropical Rainforests: Diversity and Conservation*, edited by Frank Almeda and Catherine M. Pringle and co-published with the American Association for the Advancement of Science, and *Biomedical Importance of Marine Organisms*, edited by Daphne G. Fautin, are proceedings of Academy symposia on these important topics.

The Research Division’s scientific staff continued the Academy’s long and successful tradition of field studies and systematic research projects.

Dr. Frank Almeda completed a long-term study of the Melastomataceae of Nicaragua, a flora that includes 26 genera and more than 160 species.

In response to a request from the California Department of Fish and Game, Dr. John E. McCosker studied the effects of imported freshwater eels (family Anguillidae) on California’s habitats and native species. His report was used by the Department to prohibit the importation and release of non-native eels in the state’s waters.

Dr. Pepper W. Trail, in the Department of Ornithology and Mammalogy, was awarded the Academy’s Tilton Postdoctoral Fellowship in Systematics, following an international competition. His research focuses on the origins of Darwin’s Finches and the search for their nearest living relatives through comparative osteological and behavioral studies.

Research Division staff members’ involvement in the continued effort to develop and complete the Museum’s major new exhibit halls, “Wild California” and “Life Through Time,” was an important focus during the year. Scientists from every research department served as consultants and advisors to designers and fabricators. Research staff conducted fieldwork to collect specimens used in the dioramas. And in an unprecedented effort to assure the greatest possible level of accuracy and detail in replicas of organisms reproduced at 50 to 200 times their actual size, scientists and artists collaborated in the use of the Research Division’s scanning electron microscope to examine minute specimens in great detail.

During the year, Academy scientists conducted field or museum research in twenty-five countries on all continents. In Tanzania’s Eastern Arc Mountains, Dr. Robert Drewes and Jens Vindum collected reptiles and amphibians, and brought back 1,100 preserved specimens and 600 tissue samples. In Chiapas, Mexico, Dr. Dennis Breedlove, sponsored jointly by Conservation International and the Academy, worked with the government of that state in identifying areas to be included in their system of forest preserves. In the Soviet Union, Dr. Tomio Iwamoto, sponsored by the National Academy of Sciences, studied macrourid fishes together with Soviet scientists. Dr. Michael Ghiselin spent most of the year at the Free University of Berlin, and Dr. Frank Almeda spent a month working with colleagues in museums from Brussels to Madrid.

At the Academy, there were several new appointments and promotions on the Research Division staff. Dr. Thomas F. Daniel was promoted to Associate Curator of Botany and appointed chairman



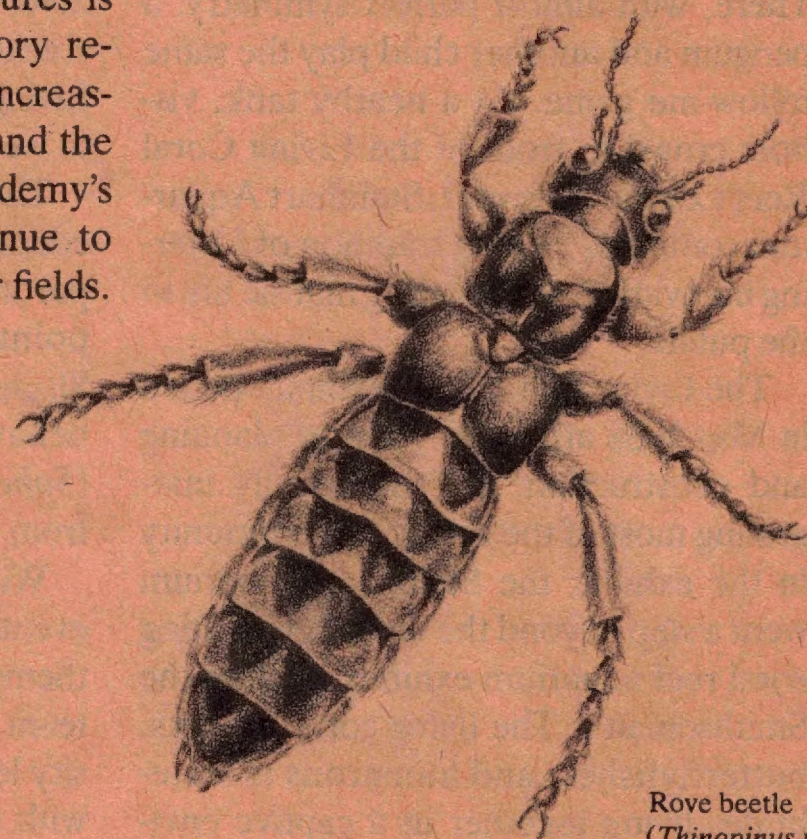
Blakea anomala J. D. Smith (Melastomataceae)

of his department, succeeding Dr. Dennis Breedlove in that position. Dr. Paul Arnaud, Jr. was appointed chairman of the Department of Entomology, replacing Dr. Wojciech Pulawski. Following a postdoctoral fellowship at the University of Michigan, Dr. Jacques Gauthier received a five-year contract appointment as Assistant Curator in the Department of Herpetology. And Dr. Terrence M. Gosliner was appointed chairman of the Department of Invertebrate Zoology and Geology, replacing Dr. Peter Rodda.

The National Science Foundation continues to provide vital grant support for departmental collections through its Biosystematic Research Resources Program. In addition, four individual researchers received NSF grants this year: Dr. Wojciech Pulawski's multi-year grant (Entomology) will support a worldwide generic revision of wasp species in genus *Gastrosericus*. Dr. Jacques Gauthier (Herpetology) will study the origins of dinosaurs under his NSF grant. Dr. Michael Ghiselin and Dr. Terrence Gosliner (Invertebrate Zoology and Geology) have received a grant to study the relationship between ribosomal RNA sequence and phylogenetic parallelism in gastropods.

During the year, the Academy provided more than 88,700 specimens from its collections, in 655 separate loan transactions, in support of systematic research being carried out by scientists around the world. Professionals and students, studying materials in the collections at the Academy, made more than 4,800 individual visits to our research departments and received staff assistance during the year. More than 175,800 specimens were accessioned into the Academy's collections during 1987-1988; total holdings now exceed 13.9 million specimens. Growth and use of departmental collections during the year are summarized in the adjoining table.

Emphasizing the need for further research, entomologist Kavanaugh notes that the original purpose of the Academy's founders was to catalogue California's living heritage. "We have barely begun to inventory some groups of animals that are present in the state," he says, "and research on insects and other small-sized, but abundant creatures is still in its infancy." Natural history research is an indispensable tool in increasing our knowledge of California and the world, and 135 years after the Academy's beginnings, its researchers continue to make major contributions in their fields.



Rove beetle
(*Thinopinus pictus*)

GROWTH AND USE OF COLLECTIONS IN RESEARCH DEPARTMENTS

Divisional Summary

DEPARTMENT	ACQUISITIONS Total Specimens Accessioned	LOANS Total Specimens Loaned	RESEARCH Total Visitors (no. of visitor days)
Anthropology	227	235	89
Aquatic Biology	n/a	n/a	648
Botany	17,500	9,520	1,063
Entomology	120,613	68,463	1,385
Herpetology	5,270	1,531	78
Ichthyology	16,926	4,144	219
Invertebrate Zoology and Geology	15,000	4,000	87
Ornithology and Mammalogy	296	537	1,266
Totals	175,832	88,730	4,835
Total Holdings in All Collections	13,928,274		

STEINHART AQUARIUM

AS OTHER children watch, a small girl paces up and down beside a translucent wall of water. In the water on the other side of the wall, a dolphin follows the girl's movements. It races along next to her, then turns a graceful underwater somersault as she switches direction. Penguin calls echo from a few feet away. There, with almost perfect symmetry, a penguin and another child play the same follow-me game. At a nearby tank, visitors crowd in front of the Living Coral Reef exhibit. This year, Steinhart Aquarium continues its long tradition of fostering innovation and showing marine life to the public.

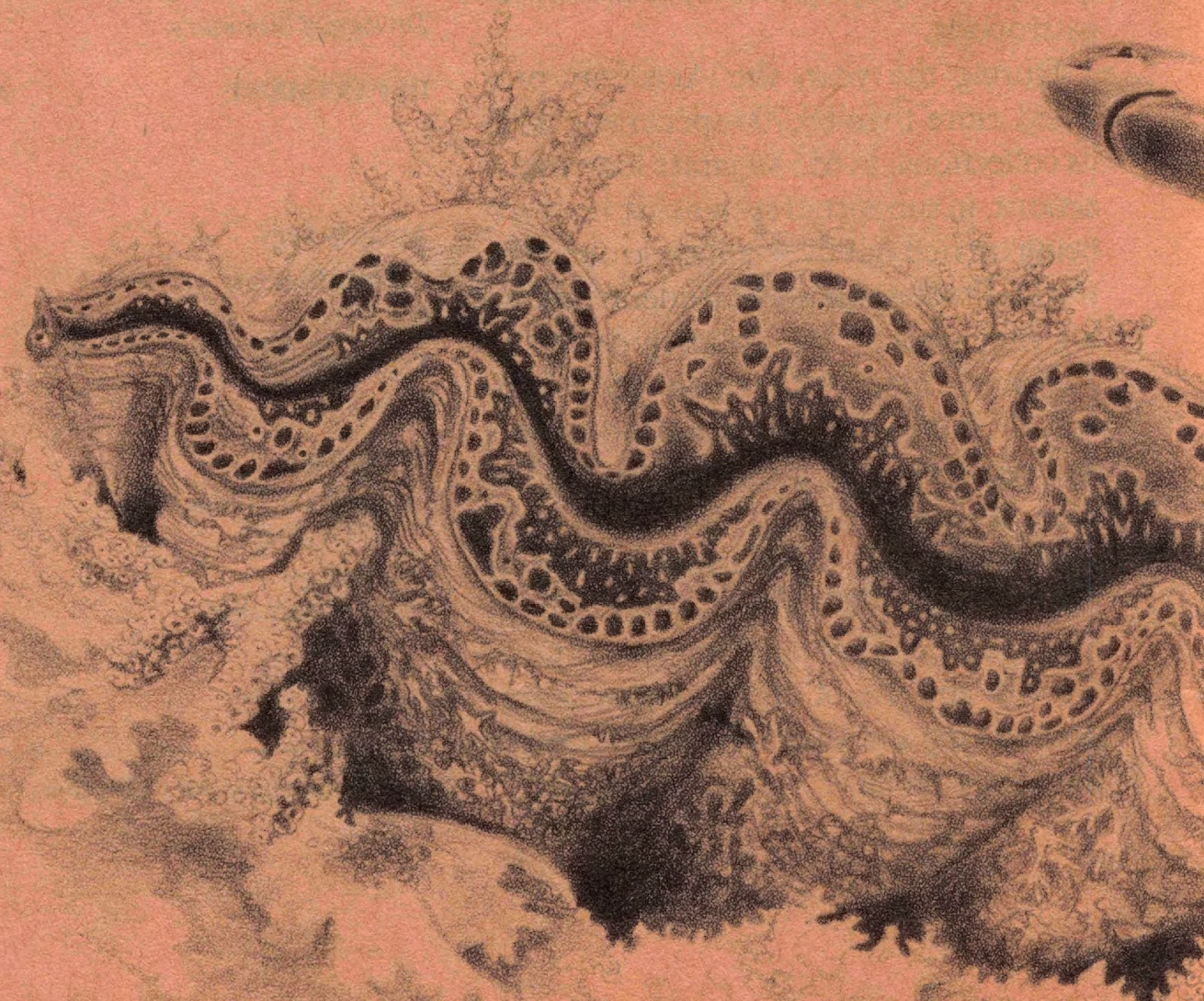
The Living Coral Reef exhibit opened in May 1988 after two years of planning and construction. By successfully integrating most of the coral reef community in the exhibit, the Steinhart Aquarium went a step beyond the few other existing coral reef aquarium exhibits, such as the Smithsonian's. The living corals, sharks, butterflyfishes, and numerous invertebrates living together in a captive environment made it a challenge to maintain a healthy water chemistry. Smithsonian scientists had warned that a complete community could not be sustained, as sharks' toxic waste products would accumulate in the water. "We had to compensate for the buffering capacity of the infinitely large ocean," says Aquarium Director John McCosker, "so we invented a unique filtration system." After living plants were added to the filter system, carefully monitored water flow over the coral reef provided the necessary water quality. Led by Aquatic Biologists Lloyd Gomez and Marty Wisner, many aquarium staff members took great satisfaction in contributing to the exhibit's success.

For visitors and scientists alike, part of the fascination with the Living Coral Reef will be watching the reef mature. "The coral reef is so complex that even the aquarists have no idea how many animals there are," McCosker declares. "We began by bringing in 'live rocks,' with little shrimps, nudibranchs, other invertebrates, and algae hiding in the cracks." As these hitchhikers grow, the Living Coral Reef changes from week to week.

The Aquarium continued to support education and research through the Department of Aquatic Biology. Newly appointed Staff Aviculturist Christina Slager continues to study the breeding behavior of the black-footed penguin (*Spheniscus demersus*), aided by a grant from the Institute for Museum Services.

Will captive animals in a safe but uneventful environment choose to amuse themselves if given a choice? This year a team from San Francisco State University led by Dr. Hal Markowitz continued with the Marine Mammal Environmental Enrichment Project. Gifts of computer software and hardware from Atari have helped the project.

"Environmental enrichment" for the Academy's dolphins (*Lagenorhynchus obliquidens*) starts after hours, when children no longer pace the public area behind the pool. Graduate students Erik Carlson and Vicky Case lower an over-size xylophone underwater. The dolphins, Amphi and Thetus, and seals Reno and Geraldine swim close by, poke their heads above the surface in anticipation, and, remembering past experiences, touch the instrument before it's even set up. Each plastic tube is a different length and produces a different tone. The animals associate touching each tube with an object that the researchers toss in the pool—either one of the toys (including a ball and a hoop), or a fish. The toys are retrieved after thirty seconds. As Amphi selects the ball again and again, a computer records her timing and selections, while Case records the animals' behavior. "We are fairly confident that they know which object they are requesting," says Carlson. "Of course, they don't have to ask for toys if they don't want to." For the animals, distraction seems to be the main point. They hardly ever select the fish.



Giant clam (*Tridacna maxima*) with *Acropora* sp. coral attached.
Swimming above is a blacktip reef shark (*Carcharhinus melanopterus*).

MORRISON PLANETARIUM

AS OFTEN as five times a day, the line of visitors in front of the Morrison Planetarium heralds the beginning of another Planetarium show. The Planetarium celebrated its 35th anniversary on November 8, 1987, and continues to attract an audience—about 176,000 people flocked to last year's 1,060 shows.

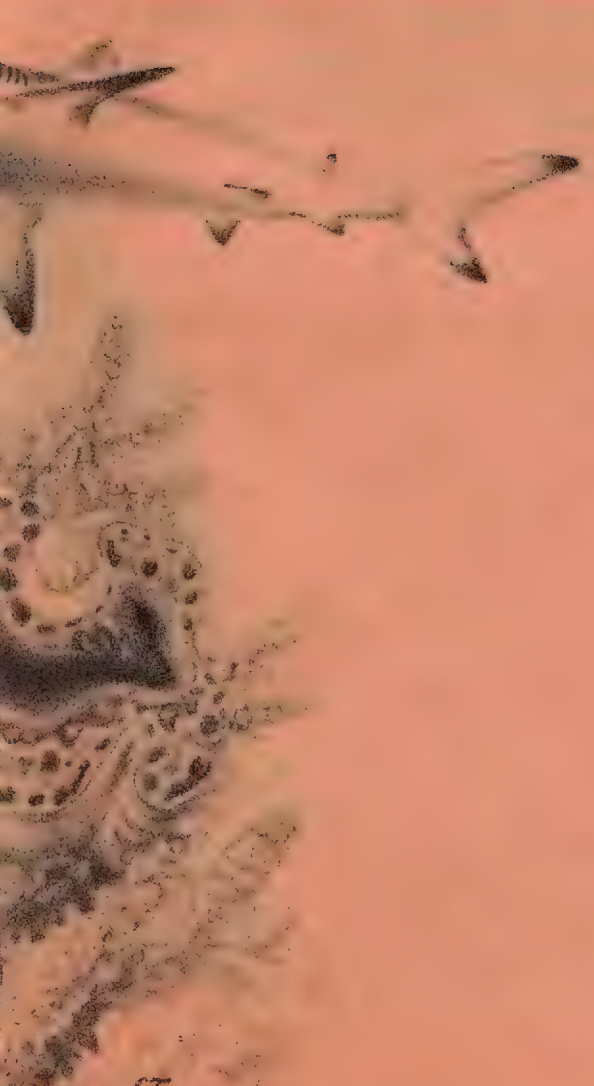
When the doors open, visitors enter the 65-foot-diameter dome, sink into the comfortable chairs, and point to landmarks in the San Francisco skyline surrounding them. Soon, the artificial sky darkens and the Summer 1988 show, "Mars!" begins. Images of the Red Planet, which on October 22, 1988 will come as close as 35 million miles to Earth, rise above the horizon. Since the big, bright planet has captured man's imagination for centuries, slides of historic drawings alternate with modern satellite images on the Planetarium's domed screen.

Other shows seen during the year include "Cosmic Limits," "Stars Over San Francisco," "Beyond the Milky Way," and the matinee "Startalk."

The Planetarium updates its programs continually to achieve its mission to educate the public about the stars and the cosmos. This year's focus was on school programs. These shows, including two new ones for grades K-3 and 3-6, are geared to the Earth Science-Astronomy curriculum developed by the California State Department of Education. More than 37,000 school children attended the 1987-1988 programs, a 25 percent increase over 1986-1987.

Plans for next year include the installation of an automation system. The Morrison Planetarium has one of the few remaining manually operated control consoles still in use in a major planetarium in the United States. An automated system will ease the operator's task and pave the way for even more fascinating shows. To quote *The Morrison Monthly*, the unofficial Planetarium staff newsletter: "Our antiquated system, installed thirty-five years ago, is a classic dinosaur. We all look forward to its impending extinction."

Not only does the Planetarium staff prepare shows and educate and entertain visitors, "We get hundreds of phone calls from people asking about astronomy—from kids to reporters," says Assistant Chairman Bing Quock. In 1988, the staff was flooded with inquiries about the alleged "Harmonic Convergence." Adds Education Coordinator Lonny Baker, "The Planetarium is available for a number of events: a wedding proposal took place here last year."



EDUCATION

THE EDUCATION department continues to offer a variety of science education services to members, teachers, and students of all ages in the Bay Area.

Teacher services in 1987–1988 included a series of afternoon meetings for San Francisco elementary school teachers, special meetings for teachers from South San Francisco schools, and a full day workshop with science teachers from Sacramento. Three full Saturday meetings concluded the last year of the three-year Biology Forum, a program aimed at informing high school teachers about current research.

The Education Department received a distinguished service award from the California Science Teachers Association. Department Chair Susan E. Douglas was honored with a “Golden Apple” award for excellence in science education from the San Francisco Education Fund and also served on the State Department of Education selection committee for the Presidential Awards in Science Teaching.

The 25th Annual Science Fair hosted over 300 student entries from around the Bay Area. There was increased attendance by both school groups and the public to view the winning science projects. Invention Convention drew entries from San Francisco students from kindergarten through eighth grade, who displayed their creations in African Hall to the delight of the Academy’s visitors. The Photography Contest for Young People, co-sponsored by KRON-TV, presented the sixth annual awards to outstanding photographers in June. The exhibit of winning photos has continued to earn the acclaim of the photographic community.

Junior Academy students enjoyed events ranging from a three-day trip to the Pepperwood nature preserve to a midnight safari in African Hall. A total of 102 field trips and courses were attended by the Junior Academy membership of 2,200. Acting JA Supervisor David Herlocker taught popular reptile classes and hands-on demonstrations.

The Adult Education Program had a very successful year with an ever-increasing variety of natural history courses and study tours. There were 99 classes and 79 study tours offered to 3,500 participants. Class topics included The History of the California Academy of Sciences, Inside Morrison Planetarium, Baptista’s Bird Biology, California Herpetology, and Marine Biology for Scuba Divers. Areas explored by study tour participants included Lassen Volcanic National Park, Anza-Borrego State Park, Yosemite Valley, and the Academy’s Pepperwood Ranch Natural Preserve. This was the first year for Barbara Hudler to coordinate this program, and the Spring 1988 issue of the Activities Calendar won an Award of Merit from the American Association of Museums.

The Office of Volunteer Services, coordinated by Diane Butler, recruits, screens, and places individuals who offer their time and skills to assist the Academy. Nearly 700 volunteers logged 44,388 hours during 1987–1988. The scientific research departments, Aquarium, Special Collections, Exhibits Department, and Special Events all recorded high totals of volunteer hours, but the Education Department led the way with 25,801 volunteer hours. In their skills and interests the Academy’s volunteers represent a broad cross section of Bay Area residents, but all share a common affection for the institution and dedication to its twin missions of education and research.

Under the Chairmanship of Sandy Linder, members of the Docent Council led 374 scheduled tours of the Academy for 11,407 students in school groups, and provided Highlight Tours for nearly 1,500 visitors and new members of the Academy. The Docents’ Supervan Program, now with two vehicles, expanded its outreach program to 9,430 students in 264 classrooms. In response to the popularity of the Aquarium Docent Tours and Supervan Programs, docents and Aquarium staff organized and conducted a new Aquarium docents’ course, which graduated 30 participants. Additionally, the Docent Council presented its Annual Teachers Workshop, and continued research and writing tasks on the diverse habitats, flora, and fauna of the new “Wild California” dioramas in Meyer Hall, in preparation for the production of docent training and teachers’ resource materials for that new exhibit area.

The Discovery Room, the Academy’s hands-on science facility, continued to be very popular with young visitors and their teachers and families. Volunteers staff the room, which provides an opportunity for self-directed explorations of nature. In the Discovery Room, the byword is “Please Touch!” On its tenth anniversary, in September 1988, the room will have had half a million visitors.

IN RESPONSE to the revolution in information technology, the Academy Library is becoming far more than a dusty collection of books. Supported by a full range of computer-based services, it is transforming itself into a dynamic resource center for scientists, teachers, and environmentalists.

Developing an appropriate role for the Academy Library within the emerging international scientific information network has been a primary objective for Academy Librarian Tom Moritz and his staff. Plans for physical renovation as well as for implementation of a fully integrated computer-based library system continued to be main priorities in 1987-1988. Improvements may include introduction of compact shelving. "Rolling shelves may provide 50 percent more space within existing stack areas," says Moritz.

Dr. Ruthann Knudson generously donated a significant portion of her anthropology library to the Academy. Her gift included more than 1,400 monographs and 1,000 periodical issues. Moreover, the Library's collection development activity during the year added a total of 507 new volumes to the 170,000 volumes held in the Mailliard Library and the eight departmental libraries.

Special Collections, a vital and widely used resource within the library, continued to grow and to modernize under the direction of Head of Special Collections, Johan Kooy. A committed staff of twenty-two volunteers assist in managing the Academy's Archives and Manuscript Collections. Kooy also oversees a burgeoning collection of media: videotapes, film, slides, photographs, records and audio tapes for staff, research, and educational applications.

THE IMPRESSIVE new Academy Store, located in Cowell Hall, is many visitors' last stop in the museum. They browse through field guides and "how-to" books, a mineral and fossil collection, and a wide selection of colorful T-shirts, mugs, and jewelry. The store's "Ethnographic Gallery" is often mistaken for a museum display. But this is the one exhibit from which visitors can take home more than memories. The Academy Store is now in its second year, and doing well. Sales topped \$1.2 million last year, 10 percent above projections.

Manager Sue Price explains some of the reasons behind the store's success: "We understand our audience, and try to cater to families with children. And we are representative of what's happening at the Academy. We sell Academy publications. If there's an exhibit, we'll stock catalogues and related merchandise. For members' meetings, we'll carry the lecturer's book."

Product development helps spread the Academy's name through wholesale distribution of popular merchandise—such as the fish mugs developed in connection with the Coral Reef exhibit—to other museums.

More than a purely commercial venture, the store distributes science-oriented educational materials and allows visitors to deepen the knowledge of the natural world they have acquired at the Academy. "We are very much part of the Academy's educational mission," says Price.



Common murre chick (*Uria aalge*)

DEVELOPMENT

DEVELOPMENT

During the 1987-1988 fiscal year, the "Academy for the '90s" Campaign exceeded its \$12.8 million goal, raising \$15.3 million. The campaign was launched with two initial gifts—Mr. and Mrs. William R. Hewlett provided \$4 million, and Janet and Jeffery W. Meyer and the G. H. C. Meyer Family Foundation contributed \$1 million for the "Wild California" exhibit. Many other individuals, the State of California, the City and County of San Francisco, and the foundation and business community responded to the Academy's campaign with generous support.

William J. (Jerry) Hume, Trustee and Chairman of the Development/Membership Committee, led a successful Annual Fund campaign to raise contributions for museum operations. Unrestricted donations totaled \$943,367, a 52 percent increase over 1986-1987. The 1987-1988 Annual Fund total of \$1,685,820, including restricted contributions, represents a 25 percent increase over last year.

In response to two special mailings, members contributed over \$15,000 toward the purchase of a new console for the Morrison Planetarium. The 1,176 members who participated in the Academy's first raffle drawing raised an additional \$40,625 for the museum's ongoing activities.

MEMBERSHIP

To help meet increased operating costs, the Academy raised membership fees for the first time in five years. Family, individual, senior, senior couple, and student fees went up by \$5.00 effective January 1, 1988.

The Academy's membership base stabilized at 22,000 members. A direct mail membership drive helped recruit more than 1,000 new members this year.

SPECIAL EVENTS DEPARTMENT

Events coordinated by the Academy's Special Events Department included the annual Friends' Dinner, the Fellows' Banquet and Meeting, the celebration of the Academy's 135th birthday, a Chamber of Commerce reception, and opening receptions for the "Tracks in the Sky" exhibit and the Steinhart Aquarium's Living Coral Reef. The Academy facilities were rented by companies and other groups for fifty events, generating \$200,000. Renters included Apple Computers Inc., the International Congress of Large Dams, National Geographic, Meeting Planners International, Citicorp, Chevron, GLAXO, SQUIBB, the San Francisco Heart Association, and the American Bar Association.

"Starry Night," the third annual Academy Ball, held in October 1987, raised \$98,000 toward the Planetarium's new console. This gala evening was produced under the leadership of Mrs. George (Lucy) Jewett, Jr. and Corporate Chair Alden P. Yates of the Bechtel Group.

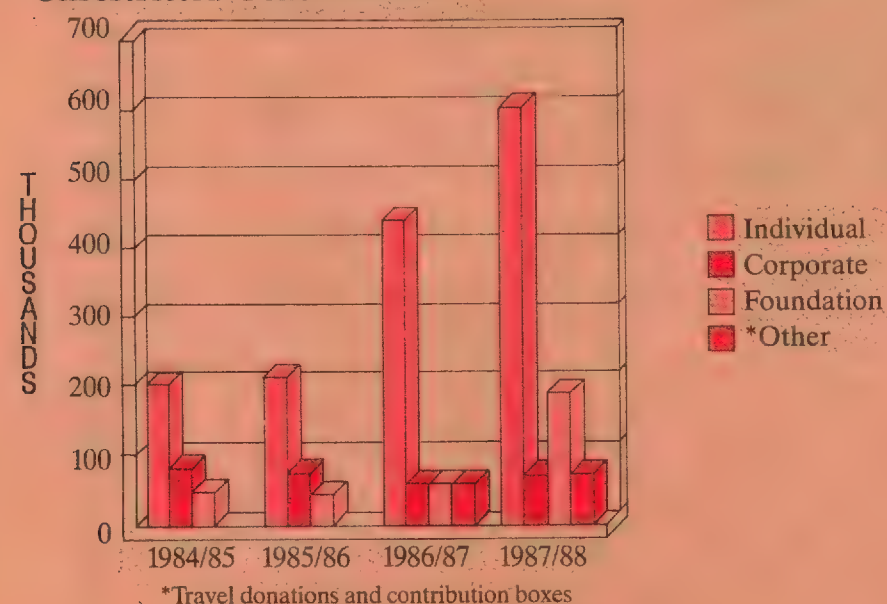
SPECIAL PROGRAMS AND INTERNATIONAL TRAVEL

The Academy sponsored twelve expeditions to intriguing destinations, including Mongolia and Siberia (with Dr. Robert C. Drewes), Tanzania (with Associate Elizabeth Dunbar), and Polynesia (with Dr. John E. McCosker). Donations from over 250 Academy members who participated in travel programs support museum activities.

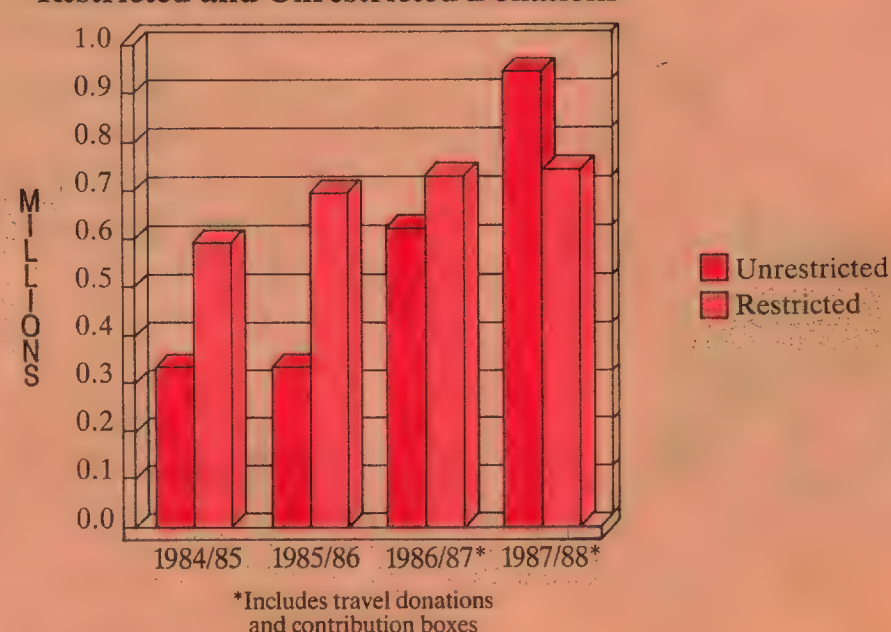
The annual Claire Matzger Lilienthal Distinguished Lecturer Program featured a presentation by Dr. Donald C. Johanson, who spoke on "Bones of Contention: Views of our Ancestors." Other programs included two symposia, "Chiles to Chocolates: Foods the Americas Gave the World," and "Assessing the Risks from Toxics in the Northern California Environment: What Science Can Tell Us." Special lectures covered a wide range of topics from "Descent of the Omo River" by explorer Roy Smith, to "East Africa's Great Migration, Natural Wonder of the World" by author/photographer Jonathan Scott.

A Christmas Festival brightened the 1987 holiday season with the premiere of Al Giddings' short documentary film "Ocean Symphony," an exhibit of "Nativity Folk Art," and the Academy's own Santa Claus.

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These individuals represent the full range of disciplines within the natural sciences and are appointed in recognition of their contributions to the growth of scientific knowledge, particularly in the Pacific region. Nominated by their colleagues and appointed by the Board of Trustees at the recommendation of the Science Council, the Fellows remain members of the fellowship for life.

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Each year, one prominent Fellow is selected for special honors. At the annual Fellows' meeting in October 1988, the institution's highest honor, the Fellows' Medal, was presented to Dr. Peter H. Raven, Director of the Missouri Botanical Garden, for his remarkable and distinguished career in botany. Dr. Raven is recognized as an international expert on species loss and habitat destruction, particularly in the tropics.

Dr. Raven is Home Secretary of the National Academy of Sciences and a current MacArthur Fellow.

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Ecuadorian scarab beetle
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Cox, Janet

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DeMouthe, Jean F.

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* Inadvertently omitted from the 1986-1987 Annual Report

FINANCIAL STATEMENTS

● BALANCE SHEET

June 30, 1988

(With Comparative Totals for 1987)

	<i>Current Funds</i>		<i>Endowment Funds</i>			<i>Total All Funds</i>	
	<i>General</i>	<i>Restricted</i>	<i>General</i>	<i>Restricted</i>	<i>Museum</i>	<i>1988</i>	<i>1987</i>
	<i>Operating</i>	<i>Funds</i>	<i>Purpose</i>	<i>Endowment</i>	<i>Modernization</i>		
	<i>Fund</i>		<i>Endowment</i>	<i>Fund</i>	<i>Fund</i>		
			<i>Fund</i>				
ASSETS							
Cash:							
Commercial accounts	\$ 480,563	112,604	—	36,738	278,770	908,675	603,169
Savings accounts and money market funds	—	1,330,140	—	3,465	5,565,186	6,898,791	6,063,693
Receivables:							
Research grants	—	733,183	—	—	—	733,183	1,096,249
Accrued interest and dividends	—	—	175,867	58,812	1,430	236,109	158,655
Other	208,240	13,784	218,239	30,335	511	471,109	124,720
Inventory	252,306	—	—	—	—	252,306	233,068
Prepaid expenses	210,021	650	—	—	5,160	215,831	178,558
Investments in marketable securities	—	—	17,733,569	4,963,337	1,213,164	23,910,070	21,892,535
Real property	—	—	1,258,084	808,460	—	2,066,544	2,803,886
Due from (to) other funds	(464,352)	155,528	303,701	(121,063)	126,186	—	—
Total Assets	\$ 686,778	2,345,889	19,689,460	5,780,084	7,190,407	35,692,618	33,154,533
LIABILITIES AND FUND BALANCES							
Liabilities:							
Accounts payable	466,279	44,657	56,833	18,402	165,954	752,125	593,044
Deferred grant revenue	—	668,511	—	—	—	668,511	946,712
Deferred restricted support	—	—	—	—	6,323,809	6,323,809	5,226,536
Other liabilities	220,499	—	—	—	2,588	223,087	305,312
Funds held in custody	—	12,668	—	—	—	12,668	533,379
	686,778	725,836	56,833	18,402	6,492,351	7,980,200	7,604,983
Fund balances:							
Current restricted:							
Research grants	—	68,473	—	—	—	68,473	84,618
Special projects	—	1,551,580	—	—	—	1,551,580	1,263,000
Museum modernization	—	—	—	—	698,056	698,056	392,429
Endowment funds, substantially under board discretion	—	—	19,632,627	5,761,682	—	25,394,309	23,809,503
	—	1,620,053	19,632,627	5,761,682	698,056	27,712,418	25,549,550
Commitments and contingencies	—	—	—	—	—	—	—
Total Liabilities and Fund Balances	\$ 686,778	2,345,889	19,689,460	5,780,084	7,190,407	35,692,618	33,154,533

The information on these pages has been summarized from audited financial statements, copies of which are available upon request from the office of the executive director.

● **STATEMENT OF CURRENT UNRESTRICTED GENERAL OPERATING FUND REVENUES, EXPENSES, TRANSFERS AND FUND BALANCE**

Years ended June 30, 1988 and 1987

	1988	1987
Operating revenue:		
Admissions	\$ 2,514,156	2,200,396
Contributions	939,804	675,020
Memberships	583,632	586,488
Concessions, sales and other	797,349	519,415
Tuition and program fees	233,817	180,181
Government grant income	—	75,000
City and County of San Francisco	1,594,403	1,559,417
Total operating revenue	6,663,161	5,795,917
Non-operating revenue:		
Unrestricted endowment allocation	1,089,377	2,154,416
Special donations	265,000	—
Commercial building rent, net	534,786	562,031
Restricted funds transfers and endowment earnings	127,301	181,000
Total non-operating revenue	2,016,464	2,897,447
Total revenues and transfers	8,679,625	8,693,364
Expenses:		
Research	2,308,972	2,193,535
Public programs	2,317,854	2,503,559
Aquarium	1,623,014	1,606,556
Development and membership	1,039,893	1,003,736
Management and general	1,259,956	1,235,525
Government grant overhead cost reimbursement	(140,384)	(63,462)
Total operating expense	8,409,305	8,479,449
Capital expenditures	270,320	213,915
Total expenses	8,679,625	8,693,364
Excess of revenues and transfers over expenses	—	—
Fund balance, beginning of year	—	—
Fund balance, end of year	\$ —	—

● **STATEMENT OF CHANGES IN FUND BALANCES**

Year ended June 30, 1988

(With Comparative Totals for 1987)

	Current Funds		Endowment Funds			Total All Funds	
	General Operating Fund	Restricted Funds	General Purpose Endowment Fund	Restricted Endowment Fund	Museum Modernization Fund	1988	1987
Balances at beginning of year	\$ —	1,347,618	18,930,821	4,878,682	392,429	25,549,550	22,482,047
Additions:							
Admissions	2,514,156	—	—	—	—	2,514,156	2,200,396
Contributions and memberships	1,788,436	786,004	632,993	697,509	2,162,845	6,067,787	7,044,214
Deferred for capital campaign	—	—	—	—	(1,097,273)	(1,097,273)	(1,851,597)
Tuition, fees, concessions, sales	1,021,269	381,266	—	6,816	—	1,409,351	920,225
Government and foundation grants	—	790,747	—	—	1,750,000	2,540,747	754,825
City and County of San Francisco	1,594,403	—	—	—	—	1,594,403	1,559,417
Investment income	9,897	79,424	1,055,135	327,412	305,627	1,777,495	1,516,535
Net gain on sale of securities	—	—	109,796	203,666	—	313,462	3,035,847
Commercial building	534,786	—	—	—	—	534,786	562,031
Other income	—	—	302,800	12,382	—	315,182	58,880
Fund allocation and transfers to (from)	1,216,678	205,552	(1,089,377)	(332,853)	—	—	—
Total Additions	\$ 8,679,625	2,242,993	1,011,347	914,932	3,121,199	15,970,096	15,800,773
Deductions:							
Salary expense	4,917,071	529,698	—	—	665,736	6,112,505	5,609,050
Fringe benefits and payroll taxes	772,887	93,647	—	—	148,674	1,015,208	927,902
Departmental operating expense	1,254,004	690,380	—	—	478,959	2,423,343	2,237,048
Building operations and allocated expenses	1,465,343	338,221	309,541	31,932	552,792	2,697,829	2,777,505
Capital and permanent exhibit construction	270,320	318,612	—	—	969,411	1,558,343	1,181,765
Total Deductions	8,679,625	1,970,558	309,541	31,932	2,815,572	13,807,228	12,733,270
Balances at end of year	\$ —	1,620,053	19,632,627	5,761,682	698,056	27,712,418	25,549,550

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Text: Irinel Petrescu
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Front cover: Edible frog (*Rana* "esculenta")